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ABSTRACT

This presentation discusses the outcomes of a project that investigated the computer, information, and learning and adaptive technology needs and concerns of Canadian postsecondary students with disabilities. A series of four focus groups involving 33 students with disabilities and 25 service providers was held. The study found: (1) colleges have a larger proportion of students with disabilities than universities; (2) students who are blind have the largest array of technologies at their disposal; (3) service providers in increasing numbers are using the Internet as a means of getting information about equipment and adaptations for students and they are primarily teaching themselves how to use the equipment; (4) there is an even split between institutions that keep their adaptive technologies in one central location and those that decentralize their equipment; (5) about half of all institutions had a loan program; (6) over 80 percent of institutions indicated weekend and evening access to adapted equipment; and (7) while all institutions had access to the Internet, only half had adapted computers with Internet access. The paper includes information on students' preferences for computer access and the types of assistive devices used to enhance accessibility. (CR)

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COMPUTER AND INFORMATION TECHNOLOGIES: STUDENT AND SERVICE PROVIDER PERSPECTIVES

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Goals for today

To inform you:

- about views held by students and service providers concerning the use and availability of both mainstream and adaptive computer and information technologies and training
- about recent developments in computers for students with disabilities

Adaptech Project

- The ADAPTECH Project consists of a team of academics, students and consumers conducting research on the use of computer, information and adaptive technologies by Canadian college and university students with disabilities.
- We are based at Dawson College and are funded by both the Office of Learning Technologies (OLT) as well as by the Social Sciences and Humanities Research Council of Canada (SSHRC).
- Our goal is to provide empirically based information to assist in decision making that ensures that new policies, software and hardware reflect the needs and concerns of a variety of individuals: college and university students with disabilities, professors who teach them, and service providers who make technological, adaptive, and other supports available to the higher education community.

Adaptech Project Team (extended)

- Catherine Fichten
- Maria Barile
- Jennison Asuncion
- Iris Alapin
- Darlene Judd
- Jason Lavers
- Fay Schipper
- Christian Généreux
- Jean-Pierre Guimont
- Evelyn Reid
- Vincent Maggiore
- Alice Havel
- Joan Wolforth

Goals of The Research

Provide information needed to ensure that recent advances in computer and information technologies reflect the needs and concerns of students with disabilities and the service providers who make technological and other academic supports available.

Method

Phase 1 - 4 focus groups

- students with disabilities
- service providers
- professors
- others

Phase 2 - Interviews

- 33 students & 25 service providers
- 10 provinces, 2 territories
- English & French
- universities, colleges, distance ed.

Phase 3 - Questionnaire

- 3000 students with disabilities
- cross Canada
- in progress

Sample Characteristics

33 students

- 31 computer users
- 2 non-users of computers
- 15 males, 18 females
- mean age = 30 (17 to 56)
- College = 14, University = 17
- Distance ed. university = 2

- Included are students who:

Have medical and psychiatric impairments	36%
Have learning disabilities	30%
Have problems using their arms or hands	30%
Are partially sighted	24%
Are hard of hearing and use the oral approach	18%
Have mobility impairments or use a wheelchair	18%
Are totally blind	15%
Are deaf and use sign	3%

** 1/2 of the students had 2 or more different impairments*

25 service providers

- 9 males, 16 females
- College = 11, University = 11
- Distance ed. university = 3

Urban regions represented

- 1/3 are from small cities
- 1/3 from medium cities
- 1/3 from medium cities

Number of students with disabilities

- Mean =135 (1 to 464)

Enrollment

- Mean 9000 (138 to 34,000)

% students with disability

- 1.50% (<1% to 18%)

Results

1. Is size of city related to the percentage of students with disabilities?
    - Definitely not.

2. Is size of institution related to the percentage of students with disabilities?
    - Definitely not.

3. Is type of institution related to the percentage of students with disabilities?
    - Difference is not significant.

Universities	Distance Universities	Colleges
1.22%	1.67%	3.48%

4. What kinds of disabilities do students have at service providers' institutions?

Students who:	% Of Institutions That Have
Are hard of hearing and use the oral approach	92%
Have learning disabilities	92%
Are partially sighted	88%
Have mobility impairments or use a wheelchair	88%
Have medical and psychiatric impairments	84%
Have problems using their arms or hands	80%
Are deaf and use sign	72%
Are totally blind	64%

5. What kinds of equipment do students with different disabilities use?

(a) Equipment For Students Who Are Blind

Voice

- Voice synthesizer (hardware)
- Screen reader (software)
- Document reader (software)

Scanner Hardware and Software

- Scanner
- Specialized software for optical character recognition
- Mainstream software for optical character recognition
- Dedicated document reader

Software

- Pine e-mail
- Specialized math software

Braille

- Braille translation software
- Braille printer
- Refreshable Braille

Portable

- Braille and speak
- Type and speak

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* 81% of institutions have equipment for these students
* 90% of students use DOS based software

(b) Equipment For Students Who Are Partially Sighted

Voice
- Screen reader (software)
- Document reader (software)

Scanner Hardware and Software
- Scanner
- Mainstream software for optical character recognition
- Document manager program

Monitor
- Large
- Visors and masks to cut glare

Software
- CD-ROM encyclopedia

Portable
- Type and speak
- Laptop

* 82% of institutions have equipment for these students
* These students can use equipment of students who are blind.

(c) Equipment For Students Who Use Sign And Those Who Use The Oral Approach

Software
- Spell check
- Grammar check
- Word prediction software
- Built-in accessibility features such as visual flash
- Encyclopedia on CD-ROM

Portable
- C-Note system

* 78% of institutions have equipment for Deaf students who sign.
* 9% of institutions have equipment for students who are hard of haring and use the oral approach,

(d) Equipment For Students With a Learning Disability

Voice
- Voice synthesizer (hardware)
- Document reader (software)

Dictation program

Scanner Hardware and Software
- Scanner
- Mainstream software for optical character recognition
- Specialized software for optical character recognition designed for people who are blind
- Dedicated document reader

Monitor and image
- Large monitor
- Built in software to control font size & background color

Software
- Spelling and grammar check
- Word prediction software
- Electronic dictionary & encyclopedia on CD-ROM
- Literacy software: Plato, Pathfinder
- Tutorials: grammar, math, typing
- Flow charting software (Inspiration)

Portable
- Franklin portable language master and spell checker
- Laptop

- 70% of institutions have equipment for these students

(e) Equipment For Students With Neuromuscular Impairments

Adjustable work station
- Desk and chair height and angles adjustable

Keyboard
- Sticky keys
- Software to allow for 1 handed typing
- Keyguard
- Splints
- Wrist pads
- Key repeat adjustments

Mouse
- Joystick type mouse
- Trackball
- Touch pad
- Ergonomic mouse
- Head mouse

Voice Input
- Dictation program
- Voice control of windows programs

Sip and puff Morse input hardware and software

Scanner hardware and software
- Scanner
- Software for optical character recognition - mainstream

Monitor and image
- LCD projector

Software: Word prediction software

Portable: Laptop

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* 64% of institutions have equipment for these students

6. What kinds of institutions have NO specialized computer technologies?

Universities	0%
Distance universities	100%
Colleges	29%

- All universities have specialized technologies
- None of the distance ed. universites have
- Colleges with few students (mean =10)

7. Where is adapted equipment located?

Centralized in 1 main location	50%
Decentralized	50%

8. Does the institution have a loan program?

Yes	50%
No	50%

9. How available is the adapted equipment?

Business hours	100%
Lunch hour	95%
Evenings	89%
Weekends	84%

10. How available is the Internet?

Institution has Internet?	100%
Adapted computers with Internet?	56%

11. How are purchase decisions made?

DSS office after informal consultation with staff & students	78%
DSS office after broad-based consultation with students, computing services, adaptive technologists, faculty, library, learning center, student affairs, physical plant	22%

12. How do service providers learn to use adapted technologies?

Self taught	68%
Adaptive technology trainer	37%
Students	16%
Mainstream course	5%
Friends/family	0%
Other	58%

13. How well does service providers' method of learning work?

- Service providers' responses:

Works well	53%
So-so	42%
Not well	5%

14. How do service providers find out about what exists "out there?"

- Rank order: service providers' responses

Internet	63%
Conferences	33%
Company	29%
Adaptive magazines	25%
Faculty	25%
Word of mouth	21%
DSS colleagues	21%
Students	13%
Organizations for people with disabilities	13%
Adaptive technology trainer	8%
Mainstream magazines	4%
TV	0%
Other	25%

15. Service providers' wish lists in rank order:

1. Easy to use voice software to control computer and do dictation
2. More & better: money, up-to-date, specialized hardware/software
3. Adapted equipment in library, including printer
4. Decentralization of equipment
5. Laptops
6. Site licenses
7. Adaptive computer technologies and training center
8. More technology for students with hearing impairments
9. Space
10. Someone to show students how equipment works
11. Ergonomic furniture
12. Technician time
13. Internet access
14. Mini-workshops on adaptive technology
15. More recognition of learning disabilities

16. Where do students use their computer technologies?

Students who use a computer	94%
Use computer at school	90%
Use computer at home	84%
Use computer in library	45%
Students who use the Internet	84%
Use Internet at home	65%
Use Internet at school	58%

17. How do students learn to use computer technologies?

	Students' Responses	Service Providers' Beliefs
Self taught	86%	33%
Mainstream course	62%	14%
Friends/family	31%	5%
Adaptive tech. trainer	31%	43%
DSS service provider	0%	33%
Other	14%	29%

18. How well does students' method work?

	Students' Responses	Service Providers' Beliefs
Works well	66%	57%
So-so	28%	24%
Not well	14%	14%

19. Disadvantages of computer technologies for students with disabilities in rank order:

	Students' Responses	Service Providers' Beliefs
Long to learn, unfriendly, frustrating	1	1
Cost	2	3
Obsolescence, continual upgrading, not knowing what's available	3	4
Crashes, break downs, repairs take long, work is lost	4	2
Doesn't meet needs well (inaccurate, doesn't work well)	5	10
Health concerns (eye strain, voice...)	6	9
Dependence on technology - what if it breaks down or no electricity	7	6
Compatibility problems	8	11
Manufacturers don't support product	9	12
Interferes with social activities	10	5
False sense that computer will solve all problems	11	13
Lack of adequate training for students and service providers	--	7
Campus technology unavailable elsewhere	--	8

Implications and Conclusions

Colleges in our sample had the largest proportion of students with disabilities: 3-1/2 % of the student body. Universities, including distance universities, had only approximately 1-1/2 %. The size of the city and the size of the postsecondary educational institution were not related to the proportion of students with disabilities on campus.

The results indicate that approximately 1/2 of the student sample had 2 or more impairments, suggesting the need for adapted work stations which can accommodate the needs of students with various disabilities. This recommendation is supported by other aspects of the findings which indicate that over 80% of institutions had students who: are hard of hearing and use the oral approach, have learning disabilities, are partially sighted, have mobility impairments or use a wheelchair, have medical and psychiatric impairments, or have problems using their arms or hands. Fewer institutions reported students who are deaf and use sign or who are totally blind.

In spite of their smaller numbers, students who are blind had the largest array of technologies at their disposal. Popular solutions, such as software that reads what is on the screen, are used not only by students who are blind, but also by students who have low vision and, increasingly, by students who have a learning disability. Use of large screen monitors is another instance of this trend to "cross-use" technologies. Voice input software and scanners are two technological solutions that are used not only by students with learning disabilities, but also by those who have a variety of impairments involving their hands and arms and those who have mobility impairments. Multiple uses of adaptive technologies seems to be an important trend. Thus, it is becoming increasingly important to ensure that different types of adaptive equipment can work together.

Service providers in increasing numbers are using the internet as a means of getting information about what equipment and adaptations are out there for students, and they are primarily teaching themselves how to use the equipment. Students, too, are primarily self-taught, but they generally learn about available hardware and software form their friends or families. Wish lists of both service providers and students include "more and better" of everything as well as easy to use voice control and dictation software.

There is an even split among institutions that keep their adaptive technology in one central location and those that decentralise their equipment. Similarly, about half of all institutions have a loan program, while the rest do not. In general, smaller institutions are less likely to have specialized computer technologies for their students.

A related issue concerns hours of availability, with over 80% of institutions indicating weekend and evening access to adapted equipment. All institutions studied had access to the internet, but only 1/2 had adapted computers with internet access. All institutions consulted staff and students about equipment purchases, but only about 20% of institutions had broad-based, formal consultative committees. Internet access is rapidly becoming a key concern in postsecondary educational institutions, and a trend toward multidisciplinary and multisectorial decision making as well as toward integrated mainstream computer labs seems evident.

20. How do students find out about what exists "out there?"

Rank order of students' responses:

Friends/family	72%
Internet	38%
Mainstream magazines	31%
Adaptive technology trainer	17%
TV	17%
Adaptive magazines	14%
Organizations for people with disabilities	14%
DSS service provider	10%
Company	10%
Conferences	3%
Faculty	0%
Other	7%

21. Students' wish lists in rank order:

1. Home computer if student does not have one or better, faster, more hardware & software
2. More money, better/more up-to-date & specialized hardware/software at school
3. Easy to use voice software to control computer and do dictation
4. Adapted equipment with printer in library I
5. Laptops at school
6. Home internet access
7. More information about what is "out there"
8. Accessible library catalogues
9. Faster internet at home
10. Someone to show how equipment works
11. More recognition of learning disabilities at the institution, including testing
12. Accessible locations to plug in laptops & modems